

Chapter I—Introduction

1. 65 years ago the Motor Car Act of 1903 imposed the first speed limit in this country – a general limit of 20 m.p.h. for motor cars. Within 30 years this had become widely ignored and increasingly less effective as a safety measure. It was repealed in 1930 and replaced in 1935 by a 30 m.p.h. limit on all roads in built-up areas. Since then, speed limits in various forms have been introduced in almost every country in the world. Their use has been refined in a number of ways and most people now accept them as among the most effective of road safety measures. But they do restrict motorists' freedom and, perhaps because of this, they are a frequent source of controversy. After 65 years, questions continue to be asked about them. How effective are speed limits in reducing accidents in the conditions of 1968? Have the various refinements of the system been justified by results? In what circumstances should speed limits now be imposed? What sort of limits are likely to be most effective? Can any further improvements or refinements be achieved?

2. These are obviously reasonable questions to ask about a road safety measure which has been in use for 65 years. In that time the number of motor vehicles in use on British roads has grown from about 20,000 in 1904 (2½ million in 1935) to 14 million in 1967. The number of casualties per year has risen from 228,000 in 1935 to 392,000 in 1966. The Ministry of Transport has therefore, with the help of the Road Research Laboratory, other Government departments, the police, local authorities and many interested organisations, been making an intensive study of the whole range of speed limit policy. The object of this paper is to summarise the results of this work and to set out possible new lines of policy.

Why limit speed at all?

3. It is sometimes suggested – though it is a minority view – that there is now little need for speed limits – that the safety and performance of vehicles has been much increased, that the road system has been greatly improved, that drivers are more skilled than formerly. The Govern-

ment has therefore little justification for intervening to restrict driving speeds. Rather they should concentrate on further improving the capacity and quality of the road system, vehicle safety and drivers' skill and then leave it to the motorist, who is the best judge of his own safe speed in any particular circumstances. A speed limit, the argument goes, cannot improve on this and may even increase danger by distorting traffic patterns, causing frustration among drivers, reducing their personal responsibility to drive in accordance with prevailing conditions and obscuring the need for more specific safety measures.

4. In most of its forms this argument is almost certainly an over-simplification. In modern motorised societies most people expect to be permitted to drive – and without any very rigorous control over their driving ability. The result is that many drivers are much less skilled than they think. Moreover, even the best drivers cannot know all the risks on a road and require (and probably welcome) information which will help them in making the many decisions which they must take every minute while they are driving. A speed limit is one such piece of information and, because of its importance, it is one which it is an offence to ignore.

5. It is doubtful also whether improvements in vehicle safety and performance alone will ever make speed limits redundant. In all vehicles the driver's safety is limited by his own (and others) reaction times and there is no evidence that these have decreased significantly in recent years. So long as drivers are unwilling (as many are) to drive voluntarily at a speed which will allow them to cope with any emergency, mandatory speed limits will have an important road safety role. Nor is the argument about improvements to the road system very convincing. It is estimated that in the last quarter of this century car-mileage alone will almost double. A massive road programme is already in hand, but even so the Ministry of Transport estimates that by 1970, out of a trunk road system in England of 5,400 miles, 2,250 miles will still be severely overloaded. Assuming that in a democracy most people should be allowed to drive and that in the immediate future neither the number of drivers nor their driving standards will be much more closely controlled than at present, there will continue to be many parts of the road system where limited capacity will make a speed limit desirable. Improvements in design are unlikely to remedy this basic shortage of space.

Economic effects of speed limits

6. Another argument sometimes brought against speed limits is that by increasing journey times they impose a serious economic loss. However, such evidence as there is suggests that the effect of speed limits in increasing overall journey times (as a result of reducing maximum speeds) is not likely to be substantial. In a comparatively small country such as Great Britain this is true even of an overall limit. For example, the difference in time between a 100-mile journey at a steady 70 m.p.h. and one at a steady 80 m.p.h. is only 11 minutes. In fact, of course, such steady speeds cannot be maintained for a number of reasons, even by the fastest drivers. After the 70 m.p.h. limit was imposed it was calculated that the average journey time between London and Birmingham had been increased by no more than 4½ minutes. It follows that in the case of a speed limit on an individual length of road, the increase in cost arising from longer journey times is also likely to be comparatively small.

7. Against any increase in cost must be set the benefits of speed limits in accidents saved and lower operating costs of vehicles. In the case of the 70 m.p.h. limit the Road Research Laboratory calculated that on motorways in 1966 the total increase in time costs was of the order of £1.5m. and the total saving in accident and operating costs was about £1.7m., a net gain of £0.2m. The figures are not sufficiently precise to draw firm conclusions from this, but they do indicate that the considerable saving in accidents as a result of the 70 m.p.h. limit is not achieved at the price of significantly increased transport costs as a result of longer journey times.

The relationship between speed and accidents

8. It is not, however, sufficient merely to reject the main arguments raised against speed limits. It is necessary to show that there is a positive relationship between speed and accidents. In fact, a number of factors suggest that accidents are likely to increase in numbers and severity as speed increases. These factors are set out below:

- (a) As speed increases, the distance needed to stop a vehicle becomes progressively greater. Under ideal conditions (a good car on a good dry road with a good driver) a car travelling at 30 m.p.h. can rarely stop in less than 75 ft. At 60 m.p.h. it needs not 150 ft. but 240 ft. Many drivers require up to twice

these distances, and the distance needed may also be doubled on wet roads, even for vehicles in very good condition.

- (b) The minimum safe separation distance between vehicles also increases with speed, and since many drivers do not maintain these distances there is a greater risk of accidents at higher speeds. On a fairly empty motorway – the M.1 in 1960/61 – 29% of reported accidents (not in fog) involved one vehicle colliding with the rear of another. In 1965/66, with much more traffic, the proportion was 37%.
- (c) The distance travelled in the driver's reaction time (which is usually about 0.75 seconds but may be more) increases with speed. At 60 m.p.h. a coach length can be covered in the time it takes to blink an eye (about $\frac{1}{2}$ second).
- (d) The skidding resistance of wet roads decreases as vehicle speeds rise. Tests have shown that at speeds approaching 100 m.p.h. the skidding resistance of such roads may fall to less than half its value at 20 m.p.h.
- (e) Pedestrians' estimates of the speed of an approaching vehicle are less reliable the higher the speed of the vehicle. They are $3\frac{1}{2}$ times as likely to misjudge the speed of a vehicle approaching at 60 m.p.h. as that of one approaching at 20 m.p.h. When the same people are driving a car they are likely to make similar wrong estimates of the closing speeds of other vehicles.
- (f) The risk of mechanical failure due to metal fatigue, overheating and so on is obviously more likely at high speeds, especially when they are sustained. Burst tyres are a particular danger, and 20% of breakdowns on motorways are the result of tyre failures. (The recent tyre regulations should produce some improvement in this figure.) The chances of regaining control after a mechanical failure are correspondingly reduced at higher speeds.

These factors – most of them tested in experiments by the Road Research Laboratory and others – all suggest that, other things being equal, if speeds are restricted where circumstances justify it, accidents will be fewer and less serious.

Effect of speed limits on accidents – experience at home and abroad

9. In practice, this *prima facie* case for speed limits has been borne out by results when speed limits have been imposed. In the first 12 months after the 30 m.p.h. limit was first introduced in Great Britain in 1935 there was a fall of 15% in fatal accidents and the total number of personal injury accidents fell by 6%. It is true that a number of other measures were introduced at that time—pedestrian crossings and the driving test in particular—but the full effect of these measures was felt over a period of time and it is unlikely that they were responsible for the instant fall in accidents which followed in the months after the introduction of the urban speed limit, though in the longer term they produced a considerable and lasting improvement. Similarly, a 40 m.p.h. limit, applied during the late 1950s to certain main roads in the London area which previously had no speed limit, brought a 28% reduction in fatal and serious injury accidents on them. The introduction of a 30 m.p.h. urban limit in Northern Ireland in 1956 was followed by a fall of 24% in injury accidents. After an urban speed limit was introduced in the Netherlands in 1957, the numbers of fatal and serious accidents in urban areas fell by 10% relative to the numbers in rural areas.

10. The introduction of a 60 k.p.h. limit in built-up areas in Switzerland in 1959 was associated with a 6% drop in the number of casualties and a 21% fall in the number of fatalities. The 50 m.p.h. limits imposed on certain weekends in England in 1960 produced a 15% reduction in all injury accidents on them. (See also paragraph 34 in Chapter III.) In all these cases, the fall in accidents was associated with marked reductions in the proportion of faster vehicles. And in each country the number of casualties had otherwise been tending to rise. In no case were any increases in the number of casualties recorded. It seems very unlikely that all these reductions following the introduction of speed limits could be due to any other cause than the limits and their associated enforcement and propaganda.

11. This evidence all confirms that when speeds are reduced so is the risk of accidents. In addition to the factors mentioned in paragraph 8, a further reason for this is that the *range* of speeds is narrowed and so, in many situations, the 'closing speed' of vehicles is reduced. Conflicts between vehicle and vehicle and vehicle and

pedestrian are therefore also reduced and drivers have a greater chance of correcting errors and coping with any emergency. The evidence also shows that speed limits have a big effect in reducing the severity of accidents, and particularly in reducing the number of fatalities. The question therefore becomes not 'Why speed limits?' but 'What limits and where?'

General principles for application of speed limits

12. Criteria for deciding on particular limits are considered in rather more detail in later chapters. At this point it is important to consider the basic principles which lie behind them. The first of these is that, despite their many advantages, speed limits are continually in danger of being disregarded. This is partly because they impose a restraint on many people; partly because they are so easy to break; partly because some are poorly related to conditions on the road; and partly because they are, from their nature, difficult to enforce. The Government has therefore always held the view that speed limits must be 'realistic', i.e., the reason for them must be understood and they must be so suited to conditions on the road as to seem a reasonable and acceptable restriction to most road users. Limits must also be kept under continuous review by the authorities to ensure that they do not become outdated with changing conditions.

13. This policy has the advantage that the limit chosen reflects the judgment not only of the authorities but also of the majority of drivers. And it enables the police to concentrate their effort on the minority who persist in driving at a speed above that which most of their fellow motorists consider reasonable. On the other hand, although such a policy seeks to preserve the effectiveness of individual limits and of speed limits generally, it is sometimes regarded as an admission of defeat; it is claimed that it under-rates the deterrent value of possible prosecution and that it is, in fact, an acknowledgement that the law cannot be enforced. To some extent this is true. If there were unlimited resources of police manpower a greater number of prosecutions might be possible, though it is arguable whether this would be an economical use of resources both of men and money.

14. An alternative view is that past policy has concentrated too heavily on realism and that in many cases a lower limit – even if imperfectly enforced – would reduce speeds and accidents. On this view, a 30 m.p.h. limit

driven at 35 m.p.h. would be preferable to a 40 m.p.h. limit. A major objection to this argument is that limits set in this way would, in fact, be trading on such respect for speed limits as has been built up over the years by having realistic limits. Moreover, if 'unrealistic' limits of this kind were widely introduced, there would presumably be occasional prosecutions for breaking them. The feeling would soon grow that speed limits were being set unreasonably low and that enforcement was arbitrary. On the other hand, as these limits would not be enforced to the same extent everywhere, motorists would find they could break them with impunity in some places and would be tempted to do so elsewhere where a 30 m.p.h. limit was really needed and was enforced. The inequity of this is obvious. It seems better to attempt to set all limits at the right level and then enforce them, so far as possible equally.

15. But drivers cannot always be relied on to drive at a speed which is suited to conditions. For example, even on a well signed road, drivers cannot be aware of the severity of all the hazards, especially if they are strange to the road. And while one can rely to a great extent on the judgment of individual drivers to travel at a speed which would be safe on an empty road, they may not select a level which is safe for drivers on that road in traffic, bearing in mind that some other drivers are less competent than themselves. The speed limit imposed must, in short, acknowledge that each driver is a part of general traffic and that his behaviour can and does affect other drivers. For example, the research described in paragraph 8(e) above has shown the difficulty of estimating the closing speeds of vehicles approaching at very high speed. On any road, and particularly on a motorway, an accident may be caused if a driver misjudges the closing speed of a vehicle approaching at high speed from behind. The driver of the faster vehicle may himself be highly skilled, but he has taken insufficient account of the fact that he is part of a group and of the effect which he has on other drivers, some of whom may not wish to travel so fast, or may lack the skill and experience to do so.

16. The fact that some people, for very good reasons, wish to drive more slowly than others is undeniable, and it would probably not be in the interests of safety to encourage them to go faster. Since there is some evidence that wide speed differentials are in themselves a source of danger, the existence of these slower drivers is another

reason why some restriction may have to be imposed on faster drivers' choice of speed. (This is quite apart from the deliberate 'crawler', who is a different problem.) It may be that in future drivers will – with more uniform systems of training – conform more to a pattern and voluntarily adopt more uniform speeds. In the short term, speed limits can narrow the differential in speeds and so reduce the risk of conflict as a result of present differences in driving behaviour.

17. It is therefore sensible for the authorities to decide whether a limit should be imposed and, if so, at what level. In doing so, they need to consider, in addition to the speeds of individual drivers, the quantity and character of traffic (including the numbers of pedestrians) ; the quality of the road ; and the intersections and accesses along it. The type of area through which the road runs – its environment – is also a relevant factor since it is by which many limits are recognised. To a great extent also the environment determines the use made of the road and, consequently, the potential accident risk upon it. In many cases the past accident record will give a general indication of the extent of this risk. In other cases, where there is no (or little) past experience of accidents, a more detailed study of the other factors will be needed. The possibility of accidents can in this way be predicted.

18. Inevitably, when so many factors must be considered, the resulting judgment must contain some subjective element. Moreover, there is no automatically 'right' answer to the question 'what limit?' since the authority imposing a limit is, in the last resort, balancing traffic movement against accident savings, and the result must depend on the relative value given to each. In some cases, particularly where general limits are imposed, an economic calculation can be attempted in which the costs imposed by a limit are set against its benefits. But some of the benefits and losses are not known accurately or are intangible and, as the work done on the economic effects of the 70 m.p.h. limit shows, the final calculation is often very finely balanced and subject to considerable margins of error. While, therefore, an economic calculation may be helpful in some cases, it would not be worthwhile for all the hundreds of individual speed limit cases which arise. Some subjective element must therefore remain. Its extent can, however, be diminished by the use of clear criteria and adequate data.

Chapter II—Urban Speed Limits

Accidents in Urban Areas

19. In 1966 286,000 casualties occurred in the towns and cities of Great Britain — 73% of all the casualties which occurred in that year. 80,000 of these casualties were pedestrians and, of these, 35,500, or nearly half, were children. 60% of the casualties in towns and cities in 1966 were pedestrians and riders of two-wheeled vehicles compared with 22% elsewhere. The Ministry of Transport's Area Road Safety Unit at Kenilworth has made an analysis of 4,480 pedestrian accidents in built-up areas. People over the age of 60 were involved in 18% of these and children under the age of 15 were involved in 47%.

The Character of Urban Areas and the Role of Urban Limits

20. These figures indicate that the incidence of accidents is considerably higher in urban areas than elsewhere and that pedestrians and cyclists are especially vulnerable. This is inherent in the nature of urban areas, where concentration of the population around a busy road system produces the conditions in which accidents are most likely to occur. In urban areas traffic is at its most mixed — pedestrians, cyclists, industrial and commercial vehicles, cars and buses. It also engages in a much greater variety of activities than elsewhere — frequent stopping and starting, turning, parking, loading and unloading — all of which increase the likelihood of accidents.

21. In these conditions, speed limits can help to reduce both the frequency of conflicts and their severity. In Great Britain the principal urban limit is set at 30 m.p.h. and applies, with some exceptions, to all roads in urban areas on a 'blanket' basis. The exceptions are roads in urban areas which for special reasons have been de-restricted or on which a higher limit of 40 or 50 m.p.h. has been imposed by Order. Of these, the most important exception is the 40 m.p.h. limit. This semi-urban limit is a comparatively recent innovation. A number of experimental 40 m.p.h. limits were imposed in the late 1950s on certain main roads in the London Traffic Area. This followed the

recommendations in a report of the London and Home Counties Traffic Advisory Committee in 1956. 40 m.p.h. limits have been introduced on a much wider scale since 1962. Research work on the effectiveness of 40 m.p.h. limits showed that where they were imposed on roads which formerly were without a limit they did, on the average, secure a significant reduction in injury accidents and an even greater reduction in fatal and serious accidents. On roads formerly subject to an ill-observed 30 m.p.h. limit there was no significant change in the number of accidents when the limit was replaced by a 40 m.p.h. limit. Indeed, if the 85 percentile speed (i.e., that speed which is not exceeded by 85% of car drivers in free-flowing conditions) is only slightly above 40 m.p.h. where a 30 m.p.h. limit is in force, raising the limit to 40 m.p.h. may actually result in a drop in speeds rather than an increase. Several reviews of urban speed limits have been made in recent years, but there are almost certainly still some 30 m.p.h. limits which could be raised to 40 m.p.h. in circumstances where a careful analysis of traffic speeds indicates that this is unlikely to result in any substantial increase in accidents.

Definition of the Urban Area

22. Most countries, like Great Britain, have applied 'blanket' limits to whole urban areas, and this administrative convenience is probably justified by the comparative homogeneity of the circumstances on most town roads. It is, however, sometimes suggested that the effectiveness of urban limits is weakened when they are imposed in this way, because of the difficulty of defining the system of roads to which the blanket limit should apply. To some extent this difficulty can be met by raising the limit to a higher level on those roads where the basic urban limit would be inappropriate. This will remove specific anomalies, but it is still necessary to define the basic urban area.

23. In this country, the urban area has traditionally been defined by the presence of a system of street lighting. However, by 1956, with the rapid extension of systems of street lighting, it had become clear that this was an insufficient criterion for the existence of a speed limit and the system was changed. The Road Traffic Act of 1956 defined the set of roads subject to a 30 m.p.h. limit once and for all as those roads on which there was on 1st July, 1957, a system of street lighting with the lamps placed not more than 200 yards apart (unless the road in question

had been de-restricted previously). Trunk and Classified roads could, in future, only be added to or removed from this basic network by Order. However, speeds on an unclassified road could still be restricted to 30 m.p.h. simply by putting up a suitable system of street lighting. This process of adding to and subtracting from the original set of roads has gone on continuously since it was first defined.

24. In practice, it is difficult to see how this principle could now be easily modified. To replace it by a system in which all restricted roads were specified by an individual Order would be an administrative nightmare, apart from the fact that every such limit would need to be indicated by repeater signs – a costly and ugly solution. The only alternative to this is to select one or more basic features of the environment which will define the built-up area as precisely as possible and at the same time be visible to road users. However, not all countries have adopted street lighting as their criterion, and some even take the view that a built-up area is self-evident. However, whether an area is 'built-up' is often a matter of dispute and it needs to be defined precisely for enforcement purposes. Street lighting is a better yardstick for this than the town boundary, which is used in some countries but rarely coincides precisely with the true built-up area.

Weaknesses of the present 30 m.p.h. limit

25. The use of the street lighting criterion leads to anomalies where the lit area does not coincide precisely with the built-up area. For example, there are many roads in suburban areas where, because of street lighting, there is a 30 m.p.h. limit, but on which a 40 m.p.h. limit would be more justified by the circumstances. The same is true of some main radial and ring routes. In these cases, speed limits tend to be widely ignored and the job of the police in enforcing them becomes very difficult. If this happens on a large scale it can weaken the effect of speed limits generally. In fact, because some authorities have insisted on imposing and retaining limits which are not fully justified, the effect of the urban 30 m.p.h. limit has been weakened in recent years.

26. All speed limits are to some extent a blunt instrument applying, once imposed, at all times of day and night and in a whole variety of different circumstances. Because of

this, it has been usual when a speed limit is proposed to consider first whether other measures are a possible alternative. Such measures can often be more specifically related to the causes of accidents, whereas a speed limit is unlikely to be effective if it is directed simply to individual or isolated hazards. A number of suggestions have been made to make speed limits more specific in their application, particularly in towns – for example, different limits by night and 'switch on' limits which could, through electronic control, relate speeds hour by hour to prevailing traffic conditions. (These ideas are discussed further in Chapter V.) Other proposals set out in the rest of this chapter are an attempt to remedy the weaknesses of the present urban limits so far as possible.

Future policy for Urban Limits

27. The great majority of those who have put forward formal views to the Department in the past two years have favoured the continuation of the 30 m.p.h. limit in urban areas, though there is an appreciable minority which would favour raising it to 35 or 40 m.p.h. One argument put forward for raising the 30 m.p.h. limit is that 85 percentile speeds of 37–39 m.p.h. on some restricted roads are now common and that it would be better to accept this fact and 'recognise' the 85 percentile speed than to persist in trying to enforce a 30 m.p.h. limit which is not observed. Another argument is based on the improved braking performance of the modern car, together with better tyres and skid-resistant road surfaces.

28. There is some force in these arguments, but against them must be set the basic fact that urban roads are more intensively used than any others. On no other roads are pedestrians and vehicles thrown so closely together in such a confined space and nowhere else are vehicles consistently packed so closely together. The pedestrian stepping out from behind a parked lorry, the small child running into the road after a ball, the car driver rushing for a parking space, the old age pensioner stepping too late on to a pedestrian crossing – all are everyday hazards of town driving, and in each case the slower the speed of the vehicle the greater the chance of avoiding an accident. Even at 30 m.p.h. the stopping distance of a car is 75 feet for a good driver, with a good car, on a good dry road; it is a great deal more in worse conditions. And 30 feet of this is 'thinking distance', however good the brakes may be.

29. This is not to say that there is no place for 40 m.p.h. limits in urban areas. On the contrary, there are many main roads where – either because the road is so designed or because of traffic engineering measures – the road is carrying primarily through traffic and there is not the same intense mixture of local activities as on other urban roads. In these cases – particularly where other safety measures (e.g. pedestrian segregation) are in force – 40 m.p.h. limits would be perfectly reasonable. However, while the urban accident record particularly to the very old and the very young remains high, and until there can be a major reconstruction of cities to provide for greater traffic segregation, there would probably be considerable risks in raising the basic urban speed limit. This view accords with that of most countries on the Continent, nine of which have a limit of 50 k.p.h. (equivalent to 31 m.p.h.). The other five Continental countries have a limit of 60 k.p.h. (equivalent to 37 m.p.h.). It seems reasonable also that street lighting should continue to be the defining feature of the basic urban limit, but that this should be supplemented more fully by other criteria to avoid any anomalies which the street lighting criterion alone might create.

30. It is clear, however, that the 30 m.p.h. limit is at present widely disobeyed and a number of possible measures designed to remedy this are set out below. The overall aim of the proposed measures is to restore the effectiveness of this limit by ensuring that it is imposed only where it is really justified by the conditions.

- (a) Draft new criteria have been drawn up for urban limits which are set out at Annex A. The main intention is that the 30 m.p.h. limit should be used mainly in dense urban conditions, where the road in question carries for a large part of the day an intense mixture of traffic engaged in a wide variety of local activities. This will include, for most practical purposes, the central areas of most towns and cities. However, for roads which have primarily a 'through traffic' function, e.g. ring, radial or other main routes, the lighting criterion would carry less weight and the normal limit should be 40 m.p.h. Limits of 50 m.p.h. are suggested for new roads, such as urban motorways, where the geometric layout has been based on a design speed of 50 m.p.h. The new criteria have been drawn up in

much more precise terms than hitherto. For each level of limit a range of figures is given, within which the 85 percentile speed of traffic should fall. Considerable importance is attached to the casualty rate on the road and the new criteria describe as accurately as possible for each level of limit the appropriate environment, traffic composition and road characteristics. This more precisely quantified guidance should limit, so far as possible, the subjective element in imposing speed limits and ensure a greater uniformity of application across the country.

- (b) The legislative provision whereby speeds on an unclassified road may still be restricted simply by the provision of a system of street lighting should be discontinued as soon as possible, since it can result in the imposition of speed limits without any careful investigation and with no opportunity for objection. As all other 30 m.p.h. limits are imposed only after detailed investigation, this is an anomaly which, with the further extension of systems of street lighting (e.g. through hitherto unlighted villages), could result in the imposition of many unrealistic limits.
- (c) Arrangements are now being made to review and revise where necessary a number of speed limits on local authority roads which are thought to be too high or too low. Other arrangements will be made to ensure that in future speed limit practice (and certainly all marginal cases) in each local authority area will come under some form of review at least once in every five years. The primary responsibility for this will obviously rest with local authorities, but the reviews will be co-ordinated by Divisional Road Engineers and carried out in collaboration with them. The object of introducing this process of continuous review of limits at the local level is to ensure that they are genuinely needed and relate to present conditions. Speed limits on trunk roads will be kept under the same process of review. The review will apply not only to normal speed limits but to exceptional low-level speed limits, for example, those imposed in some tunnels and on bridges by local bye-laws. In the event of disagreement on a particular limit, the use

of Ministers' reserve powers would not be ruled out. It is hoped that this will be rarely necessary, but it is undoubtedly important that limits should not be retained when the circumstances no longer warrant them. From this point of view a continuous review procedure is likely to be more effective than occasional checks. While it will still be possible to investigate particular doubtful cases at once, such a review should also, over a period of time, reduce the need for *ad hoc* investigations of particular complaints. It should also make possible a much more systematic and economical use of the available professional manpower.

- (d) A sustained publicity campaign will be mounted to inform the public of the law on speed limits, the benefits they can bring and the penalties of not observing them.
- (e) The extent to which speed limits can be enforced is limited by shortages of police manpower in the face of increasing duties, and it is undoubtedly difficult for the police to enforce limits which are not accepted by the public at large. Together with the above measures designed to restore the value and acceptability of urban limits, the Minister of Transport therefore proposes to discuss further with his colleagues new means of overcoming these particular difficulties.

31. It is hoped that these policies will, if steadily pursued over a number of years, restore the effectiveness of urban speed limits, while allowing motorists the maximum of freedom consistent with the safety of all road users in urban areas.

Chapter III—Rural Speed Limits

Minister's Statement of 12th July, 1967

32. In her statement to the House of Commons on 12th July, 1967, the then Minister of Transport announced that the Government had decided to continue an upper limit of 70 m.p.h. on motorways. This followed the publication of a report by the Road Research Laboratory which estimated that in 1966, with an experimental 70 m.p.h. limit in operation, fatalities and casualties on motorways were 480 fewer than they would have expected without the speed limit. This reduction included 58 fewer people killed. On roads other than motorways, the results of the experimental 70 m.p.h. limit were less conclusive and the Minister announced that further studies would be made to determine what levels and types of limit were most likely to achieve a reduction in accidents on these roads. This chapter analyses the issues which have emerged as a result of the work done so far.

Accident Record of Rural Roads

33. There are approximately 137,000 miles of roads in the rural districts of Great Britain, of which 20,000 (15%) are trunk and Class I roads. In 1964, this 15% carried 60% of all rural traffic and accounted for 70% of all the deaths and 60% of all the casualties on rural roads. This section of the country's roads seems, therefore, to be an important part of the rural road accident problem and a readjustment of speed limit policy may be able to make some contribution to its solution.

Results of the Experimental Use of 50 m.p.h. Limits

34. From 1960 to 1964, a speed limit of 50 m.p.h. was imposed experimentally on some 700 miles of main roads in England during summer weekends and accidents were compared with those on 1,000 miles of comparable roads used as 'controls'. It was found that in each year the roads restricted to 50 m.p.h. showed a striking reduction in accidents. However, the control roads also showed a reduction which was above the average for roads generally, as can be seen from the table below:

Table I

Percentage changes during operation of weekend speed limits compared with corresponding period of 1959

Year	50 m.p.h. roads		Control roads		All other roads without 30/40 m.p.h. limits
	Accidents	Casualties	Accidents	Casualties	Casualties
1961	- 26	- 21	- 21	- 18	- 5
1962	- 30	- 30	- 31	- 28	- 8
1963	- 29	- 26	- 16	- 15	- 9
1964	- 26	- 20	- 16	- 10	+ 9
Average 1961-64	- 27	- 24	- 21	- 18	- 3

The fact that the reductions were consistently greater on roads with limits than on the 'control' roads was a strong indication that the limits had at least some beneficial effect.

35. Following these results, permanent (and signed) 50 m.p.h. limits were imposed in July and August 1965 on 400 miles of trunk and Class I rural roads with particularly bad accident records. These were all single carriageway roads. Data have been collected to enable the effectiveness of these limits to be assessed, and this is now being done by the Road Research Laboratory. Final results are not yet complete, but it is hoped that at least preliminary information will be available in time for future discussion of the proposals contained in this paper.

Effects of the 70 m.p.h. Limit on Non-Motorways

36. The Road Research Laboratory Report on the 70 m.p.h. limit experiment concluded that in 1966 accidents on all-purpose rural main roads were about 3½% fewer than would have been expected without the limit. On less important roads subject to the limit there appeared to have been virtually no change in the number of injury accidents compared with those expected. There were greater reductions in fatal and serious accidents and casualties on dual carriageways than on single carriageways, probably because speeds on the former were higher before the

limit, but the extent to which the reduction could be attributed to the 70 m.p.h. limit was uncertain. The limit probably had little or no effect on the single carriageways, because speeds as high as 70 m.p.h. are possible on only a few of them.

37. On the basis of these results, the Government decided to continue with the 70 m.p.h. limit on these roads 'for the time being'. But in her statement the then Minister said : 'The Road Research Laboratory Report makes it clear that if we want to achieve a really worthwhile reduction in accidents on these roads, then we may need to consider lower limits for them. 70 m.p.h. may well prove to be the right limit for the majority of dual carriageways. But there are others bearing particularly heavy traffic where a limit of 60 m.p.h. might be more appropriate. And this might also prove to be the best limit for main roads other than dual carriageways.' The work done since the Minister made her statement has shown that two broad approaches are possible—either an extension of present policy under which 'ad hoc' or 'tailor-made' limits are imposed on selected stretches of road, or the wider use of 'blanket' limits applying to all roads of a particular type. These two approaches are considered below.

'Blanket' Limits

38. It has been suggested that given a certain intensity of traffic and similarity of environment upon types of road, a point is reached at which it becomes inconvenient to impose large numbers of individual ('tailor-made') speed limits, each adjusted to local conditions. At this point it becomes reasonable to make use of general ('blanket') speed limits applied to whole classes of road. Most urban limits, for example, are applied on this principle.

39. Two possible levels have been suggested at which blanket limits could be applied to different types of rural road in this country. In both cases the limit would be recognisable only by its environment, and in both cases it would be possible under the 'blanket' to impose a limited number of lower 'ad hoc' limits on individual stretches where this was desirable. Assuming that a distinction should be drawn between single and dual carriageways, one possibility would be to have a 70 m.p.h. limit on all dual carriageways (including motorways) and a 60 m.p.h. limit on all single carriageways. The other possibility is to have a 70 m.p.h. limit on motorways, a 60 m.p.h. limit on

all other dual carriageways and a 50 m.p.h. limit on all single carriageways. So far the discussion has centred mainly on the former suggestion, under which a new blanket limit of 60 m.p.h. would be introduced on all single carriageways where lower limits do not already apply.

40. The arguments for a graduated system of blanket limits are:

- (a) that it is the logical continuation of the present blanket limits applied to motorways and urban areas;
- (b) that it is administratively simple; and
- (c) that such limits are easily recognisable while being economical in the use of signs.

It is also argued that blanket limits of 60 m.p.h. on single carriageways and 70 m.p.h. on dual carriageways are consistent with recent measurements of 85 percentile speeds on trunk and Class I roads.

41. Against the use of blanket limits for all rural main roads, it is argued:

- (a) that general limits are an unnecessarily blunt instrument and are not sufficiently related to the specific causes and distribution of accidents;
- (b) that non-motorway main roads, both single and dual carriageways, are so diverse in character that a single blanket limit cannot be justified for each type of road;
- (c) that there is, as yet, no evidence that the accidents on the single carriageways occur on the lengths where a 60 m.p.h. limit would 'bite' into the speed distribution;
- (d) that where the limit was not closely related to conditions on the road, it would not be observed willingly and the considerable resources needed to enforce such a widespread and unaccepted limit would not be available. It would therefore be ineffective and would weaken speed limits generally;
- (e) that an unsigned blanket limit applied to the whole length of a road would not draw the attention of motorists to particular danger points where a 60 m.p.h. limit was most needed; and

- (f) that very extensive and costly publicity would be necessary to ensure that the public were made (and kept) aware of the blanket limit.

It is also suggested that while a 60 m.p.h. limit might accord with 85 percentile speeds on many trunk roads, on some busy Class I roads it would be above the 85 percentile speed. A 60 m.p.h. limit might therefore encourage an increase in speeds by people driving 'up to the limit'; this could only be overcome by large numbers of *ad hoc* lower limits which could make a nonsense of the blanket concept.

'Tailor-Made' Limits

42. The alternative to the use of blanket limits is the greater use of 'tailor-made' or '*ad hoc*' limits, i.e. limits imposed on individual lengths of road after detailed examination. In practice, on rural roads this would probably mean an extension of the present use of 50 m.p.h. limits on both single and dual carriageways with appropriate traffic volumes and 85 percentile speeds and with particularly bad accident records. Such a policy might also include the use of *ad hoc* 60 m.p.h. limits on some high speed roads with particularly bad accident records. (Draft criteria for such *ad hoc* or tailor-made limits are set out in Annex A.) Another possibility which has been suggested is a scale of limits of 30, 40, 55 and 70 m.p.h. This, too, is open for discussion, though draft criteria for a 55 m.p.h. limit have not been developed. In practice, the application of the higher level *ad hoc* limits would involve a considerable element of judgment, and normally the case for such a limit would be considered by the Minister. In the case of 60 m.p.h. limits — of which there is at present only one in operation (on the A.45 between Birmingham and Dunchurch) — it would be informative to introduce a number experimentally in the first instance. Alternatively, they could be introduced permanently but be made subject to annual review. Either way, their numbers would be comparatively limited and in each case the level of the limit would reflect a realistic assessment of the comparative risks and a judgment of possible accident savings set against restriction of traffic movement.

43. The main argument in favour of *ad hoc* limits is that they are closely related to the conditions on individual stretches of road and so to the potential accident risk which actually exists at that point. They are thus in tune

with current thinking on the need for specific studies of possible road safety measures, e.g. by the Area Road Safety Units. If properly set, they give drivers a necessary instruction which is clearly indicated by signs. Against this, they require a laborious case by case collection and examination of large quantities of data before the limit can be imposed or adjusted. In the past it has only been possible to review them from time to time, with the result that there is considerable variation from authority to authority which weakens their overall effect. In addition, the signing obligation they impose involves expenditure and there is a possibility that drivers may be confused if too many different levels of limit are introduced, though there is no experimental evidence for this. On the other hand, drivers are already well accustomed to limits of 30, 40, 50 and 70 m.p.h. and it could be argued the addition of 60 m.p.h. will make little difference. In return, a new limit of this kind would enable speeds to be closely related to likely accident risks at higher speeds as is now done (and accepted) at lower speeds.

'Blanket' or 'Tailor-Made'?

44. These are the main points which have emerged for and against both possible approaches. Ministers have reached no conclusion as yet on which solution is the better. They are particularly anxious to receive opinions, both on the principle and on the levels which should be set.

The Problem of Villages

45. Small villages present particular road safety problems and in the past it has rarely been possible to meet these by the use of speed limits. The most acute problem is that of the village which, for historical reasons, straddles a main road. In such cases the speed of the traffic is frequently high and the main road can effectively divide the village community in two. Since most villages have only one post office, village hall, church, school, etc., and since each of these is either on one side of the village or the other, people must cross the road in order to go about their daily business. This is often done at some risk and may present particular problems for the very old and the very young.

46. There is considerable feeling that in these cases the people of the village should have priority, and a speed limit of 30 or 40 m.p.h. (even, perhaps, an ill-observed one) is often suggested as a means of protecting their interests. But in practice villages very rarely have the

densely built-up conditions which have hitherto been associated with 30 or 40 m.p.h. limits. Since the main road in question is normally of a reasonable standard and high speeds are possible, it is unlikely that such limits would be observed and police resources are not available in sufficient quantity to ensure that they are. This difficulty is accentuated by the fact that the length of road through the village is usually short. This tempts drivers to chance breaking the law and makes police enforcement by patrol cars impossible. While, therefore, such limits may achieve some reduction in speeds (to the extent that they are observed voluntarily), they would rely for their effect on the general respect in which speed limits are held. As there are very many villages of this kind, the weakening effect on respect for speed limits generally could be considerable if limits of this kind were very widely introduced.

47. It has, therefore, been usual to look for means other than speed limits to meet the difficulties of villages on main roads. Similar arguments have also been applied – if anything with greater force – against the imposition of speed limits on lengths of road in isolated villages off main roads. In this case the very nature of the road usually limits speeds to well below 30 m.p.h., and enforcement of limits on winding, narrow roads in country areas is almost impossible. Nevertheless, perhaps because village residents value a lower tempo of life, and perhaps because of the intense impact which a road accident can have on a closely knit village community, there are frequent requests for speed limits in isolated villages.

Proposals for Villages

48. Because of this public concern a great deal of thought has been given to the problems of villages. However, the general conclusion from this is that the most effective contribution to the problem is often likely to be made not by speed limits but by specific road safety measures introduced after detailed analysis of accident records. These might include, for example, better signposting and road marking, the use of crossing patrols for children, the provision of footpaths and minor road improvements. However, in the case of certain of the larger or more straggling villages on lengths of main road with a particularly bad accident record, it is possible that some improvement might be secured by the use of lengths of 40 m.p.h. limit. Comments on this suggestion would be

appreciated, and also on the possibility of using advisory 'count down' speed limits on the approaches to certain villages where it is unlikely that speeds would be sufficiently reduced by the imposition of a single mandatory limit through the village centre. (See also paragraphs 64-67.) The Ministry cannot accept another suggestion made that the speed of vehicles through villages might be reduced by means of 'rumble strips' set in the roadsurface or by artificial hazards, since these could easily cause more accidents than they save. On the other hand, they would welcome views on the use of advisory speed limits in isolated villages, particularly where there are a number of hidden hazards which, even if signed, might cause difficulty to those who use the road only occasionally, e.g. for recreational driving.

Chapter IV—Vehicle Speed Limits

49. To some extent, though not entirely, speed limits related to classes of vehicle can be considered separately from speed limits imposed on types of road or individual lengths of road. The imposition of speed limits on vehicles naturally raises a number of highly complex issues concerned with vehicle technology which do not arise in the case of road speed limits. On the other hand, previous discussions of speed limit policy have included vehicle and road speed limits, and some points of general philosophy are common to both. It is right, therefore, that the subject of vehicle speed limits should be included in this paper, and a number of proposals are set out below. It may be that further work will be needed on these preliminary suggestions in the light of the comments of interested organisations, and this may take some time. If so, there is no reason why the timetable for consultation and decision making on the two types of limit should necessarily be the same.

Present Limits

50. On all-purpose roads the most important vehicle speed limits are those which restrict vehicles constructed to carry goods to 40 m.p.h. and buses and coaches to 50 m.p.h. These limits are generally 10 m.p.h. lower if a trailer is drawn. They were formerly set at a much lower level, but since 1957 they have been raised in stages to take account of improvements in design, handling characteristics and the road system generally. On motorways, as a general rule, no vehicle speed limits apply. Exceptions to this rule are – vehicles (except buses and coaches) drawing two-wheeled or close-coupled four-wheeled trailers (which are restricted to 40 m.p.h.) and buses and coaches with trailers (which are limited to 50 m.p.h.). These special limits have been maintained at their present levels because, despite improvements in the design of the best modern caravans and trailers, there are still considerable numbers of the older models and badly matched combinations of vehicle and trailer on the roads. These can be unstable at high speeds and constitute a danger both to other road users and to the driver of the towing vehicle.

Possible Types of Vehicle Speed Limit

51. In the case of road speed limits a distinction has been drawn between blanket speed limits applying to whole classes of road and *ad hoc* or tailor-made limits applying to particular lengths. This distinction is paralleled in the case of vehicle speed limits. On the one hand it is possible to argue that the physical characteristics of some classes of vehicle are such that in certain circumstances (e.g. on a motorway) a lower speed limit should be applied to them than applies to other vehicles. For example, it has been argued that the tyres of most heavy goods vehicles are not suitable for sustained high speed running on motorways. For this reason, it is said, some lower limit than the 70 m.p.h. applying to cars should be introduced. Similarly, on all-purpose roads, where traffic conditions are more complex than on motorways, the manoeuvrability, stability and braking performance of these vehicles warrant a lower limit on them, which will increase their ability to respond safely to these road conditions. Since these limits apply to all vehicles of that class at all times, this approach is similar to the blanket concept for road speed limits.

52. The alternative approach would relate vehicle speed limits much more closely to the characteristics and capabilities of individual vehicles and would provide for different speed limitations – perhaps related to brake and tyre standards – when the vehicle was being used for different purposes, e.g. long distance haulage or local collection and delivery services. This method would take more closely into account the improvements which have been achieved in modern engines, steering, tyres, brakes and vehicle design generally. The Ministry of Transport has already taken some steps towards this much more sophisticated system of vehicle speed limitation in drawing up the present 'plating' requirements for goods vehicles, under which when vehicles are 'plated' account will be taken of their tyres and the use to which the vehicle will be put, including the speed at which it will operate. In fact, as in the case of road speed limits, the one approach does not wholly rule out the other. It would be possible to apply certain limits to classes of vehicles generally, but within this to apply lower limits to individual vehicles of that class for special reasons.

Vehicle Speed Limits on Buses and Goods Vehicles

53. Many of the main inter-city routes used by buses and commercial vehicles are now of a very high quality and

some are built to near-motorway standards. Even allowing for the differences between these roads and motorways (level junctions, for example), it seems something of an anomaly that heavy goods vehicles should be limited to 40 m.p.h. and coaches and buses to 50 m.p.h. on these and all other non-motorways, while on motorways they may travel at any speed up to the general limit of 70 m.p.h. The arguments in favour of allowing all vehicles, irrespective of size or weight, to travel at speeds up to the general limit of 70 m.p.h. on motorways are that the motorways were designed and built for fast-moving traffic; that restriction on speed for some types of vehicle might discourage improvements in their design for safe long-distance travel at high speeds and that it would reduce the attraction of the motorways for economically important classes of traffic. It is also true that heavy goods vehicles are now subject to specific standards of braking efficiency, and plating of these vehicles will do a great deal to curb overloading.

54. On the other hand, it can be argued that many of the characteristics that warrant restricting the speeds of a class of vehicle on all-purpose roads are even more relevant when the vehicle is used at higher speeds on a motorway. In particular, longer braking distances and the unsuitability of many commercial vehicle tyres for sustained high speeds are important factors. Another relevant factor is the standard of maintenance of heavy goods vehicles, which in the past has been poor. This should steadily improve with the advent of the heavy goods vehicle testing scheme and the quality licensing system provided in the Transport Bill. However, the improvement is only likely to be felt gradually over a period of time. Many existing goods vehicles have not yet reached the minimum braking standards which are now required of all new vehicles and will be required of all vehicles in use by 1973. Nor has it yet been possible to solve satisfactorily the braking and stability problems of some articulated vehicles. In addition it will be some years before the special driving test, which is to be introduced for the drivers of heavy goods vehicles, can have its full effect. There may therefore be some case — in the short term at least — for limiting the speed of heavy goods vehicles on motorways, as is widely the practice abroad. There is, of course, some risk that this would reduce the relative attractiveness of the motorways for these vehicles and cause them to use the all-purpose roads, which are more crowded and dangerous and where

they would cause more congestion. On the other hand, this risk could be reduced by setting the limit at a reasonable and acceptable level. It is therefore suggested that in order to reflect the remaining risks associated with the particular characteristics of heavy commercial vehicles, they should be restricted to a speed of 60 m.p.h. when using motorways. This limit should, however, be reviewed in future as other safety measures affecting heavy goods vehicles come into effect. On other roads, irrespective of the quality of vehicles, there are risks for heavy goods vehicles associated with gradients, curves, road surfaces, level junctions and the mixture of traffic. It is therefore proposed that to reflect the overall quality of the road system and the vehicle fleet as a whole the limit for heavy goods on non-motorways should remain at 40 m.p.h.

55. Generally speaking, most buses and coaches appear to have very high standards of maintenance as well as an excellent safety record. These vehicles are subject to a stability test and their drivers must pass a special driving test. Also, the fact that they are not subject to a special speed limit on motorways has encouraged manufacturers of these vehicles to improve their design for safer long-distance travel at high speeds. In 1966, out of 38,804 people killed and seriously injured on rural roads, only 453 (including 59 drivers) were travelling on public service vehicles. The number of fatal and serious accidents in that year which involved public service vehicles on motorways in Great Britain was 15. Since some of these will have been due to causes other than speed, it is clear that high speeds by these vehicles are not a major cause of motorway accidents. Although the United Kingdom has come under some criticism from the Continent for not restricting the speed of these vehicles more severely, on balance it is considered that no vehicle speed limit need be imposed on buses and coaches when on a motorway, except when they are drawing trailers. In that case, because of the reduced stability, it should remain at 50 m.p.h. as now. The present speed limit of 50 m.p.h. for buses and coaches on rural all-purpose roads should also remain.

Speed Limits on Light Vans

56. It has been suggested that the existing 40 m.p.h. limit is both unrealistic and unnecessary on light goods vehicles, many of which have basically the same chassis and engine as private cars, with special bodies fitted to suit them for

the carriage of light goods. It is argued that the speeds that these vehicles are capable of maintaining are only slightly less than the cars upon which their design is based, and there is no doubt that their acceleration and braking performance, as well as handling characteristics generally, are far superior to those of the heavier classes of vehicle. Many light vans are purchased for use as private cars in order to avoid purchase tax. In these cases, particularly in the case of a privately owned vehicle in good condition, the temptation to exceed the 40 m.p.h. limit is very real.

57. On the other hand, the light van, used as a local delivery vehicle, is often not well cared for. The operator is anxious to get full use of the vehicle and is reluctant to have it off the road for maintenance. On occasions they are overloaded, with consequent loss of stability, manoeuvrability and braking efficiency. They are frequently in the hands of drivers who do not own the vehicle themselves and are often working to a very tight schedule. Rear vision is often poor and, despite the present limit applied to these vehicles on all-purpose roads, their accident involvement rate is consistently higher than that of private cars and is no better than it was in 1960, while those of other goods vehicles and cars have slowly improved. Nevertheless, these vehicles are used to a great extent in urban areas, and many of the accidents in which they are involved occur on roads where they are already subject to a road speed limit of 30 or 40 m.p.h. For the reasons given in paragraph 56 it no longer seems reasonable to restrict this whole class of vehicle to 40 m.p.h. on all-purpose roads, and it is proposed that this limit should be raised to 50 m.p.h. On motorways they should continue to be subject only to the general speed limit of 70 m.p.h. unless they are towing a trailer.

Enforcement

58. To secure effective enforcement of vehicle speed limits it is necessary for individual vehicles subject to a particular limit to be readily recognisable. To ensure this it has been suggested that it should be obligatory for all vehicles subject to special limits to display a plate at the rear of the vehicles indicating the level of the limit. In the case of a vehicle subject to different limits on all-purpose roads and motorways, the plate would consist of upper and lower segments indicating the two limits. This plate should be illuminated or made of reflective material. On the other hand, the cost involved in carrying out this

requirement would be quite considerable – perhaps £2–2.5m. if 1.5m. vehicles were affected. If it was thought unacceptable to impose such an additional cost it would be less easy to enforce these limits – especially in the case of vehicles on the borderline between one class and another—but in most cases the vehicles would be fairly easily recognisable as subject to a particular limit.

Controlling Speeds by Restricting Performance

59. The most likely form of control would be by the use of engine speed governors. Practically all diesel engines are currently fitted with engine governors, although they are fitted to protect the engine from overspeeding damage rather than to control the maximum vehicle speed. In general, it would appear that the control of vehicle speed by restricting performance, though attractive on the surface, has a number of disadvantages. In particular, it removes the driver's reserve of speed, which might be essential in an emergency or when overtaking. And where the control is exercised on engine speed it reduces the useful range of engine operation on all gears and therefore the flexibility of use of the vehicle is decreased.

Chapter V—Miscellaneous Suggestions

60. A number of particular measures have been put forward over the years as possible means of relating speed limits more closely to particular road or traffic conditions. It is clearly right to examine these and a number of other suggestions in the light of recent experience abroad and the very different problems which are encountered in present-day road conditions compared with those existing even a decade ago. This chapter outlines some of the possibilities which have been put forward and suggests tentative conclusions upon them.

Modified Speed Limits at Night

61. It is sometimes suggested that as roads are more lightly trafficked during the night, and at some times relatively empty, speed limits might be raised during certain hours. On the other hand, a study of accident rates on the M.1/M.10/M.45 during 1965 showed that the fatal accident rate per million vehicle miles in the dark was three times that in daylight. The same was true of the rate of serious injury accidents per million vehicle miles. These figures do not provide any justification for higher speed limits at night – at least on motorways.

62. Table II below gives figures for fatal and serious casualties in the built-up areas of Great Britain during the hours of darkness in the years since 1963. Table III shows these figures as a percentage of all fatal and serious casualties in built-up areas in that period. Table II shows that there has been a rapid increase in the total of fatal and serious casualties occurring in darkness in built-up areas from 23,433 in 1963 to 28,630 in 1966 – a rise of 5,200 (23%) in four years. In 1966 nearly half of fatal casualties in built-up areas, and 41% of serious casualties, occurred in the hours of darkness. The number of fatal and serious casualties by night in built-up areas has also increased as a proportion of all such casualties from 38% in 1963 to 41% in 1966.

Table II

Numbers of people killed and seriously injured in built-up areas during the hours of darkness, 1963-66

	1963	1964	1965	1966
Killed . . .	1,976	2,153	2,183	2,260
Seriously Injured . . .	21,457	24,009	25,108	26,370
Total . . .	23,433	26,162	27,291	28,630

Table III

Numbers of people killed and seriously injured in built-up areas during the hours of darkness as a percentage of all killed and seriously injured in built-up areas, 1963-66

	1963	1964	1965	1966
Killed . . .	47%	47%	48%	48%
Seriously Injured . . .	36%	39%	40%	41%
Total . . .	38%	40%	40%	41%

63. Apart from this empirical evidence, a number of arguments suggest that the risk of accidents is likely to be increased by night. For example, a much more limited range of vision is possible by car headlamps or under street lamps than in daylight, pedestrians and road hazards are less visible and drivers are more likely to be tired. It is not possible to stop within the visibility allowed by full headlights at speeds above 50 m.p.h. With dipped headlights or sidelights the corresponding maximum speed is considerably lower. Furthermore, the extra risk incurred by drivers having been drinking is especially prevalent at night. These are all reasons for driving more slowly by night than by day. Indeed, many states of the U.S.A. set limits 10 m.p.h. lower by night. In the face of all this evidence it would hardly seem sensible to allow higher limits by night than by day in this country at the present time.

'Count-down' Speed Limit Signs

64. A prominent feature of accidents along high speed roads has been a tendency for drivers to approach terminal points or other hazards at too high a speed and lose control, particularly in wet or icy conditions. This is particularly true where motorways end at roundabouts and drivers tend to underestimate their speed of approach to the roundabout. To illustrate this point, the speeds of vehicles approaching two terminal roundabouts on the southern end of the M.1 and M.10 motorways and one at the Maidenhead Thicket roundabout on the M.4 were measured by the Road Research Laboratory at four sites on the exit carriageway. Vehicles did not begin to slow down until they were between $\frac{1}{2}$ and $\frac{1}{4}$ mile from the terminals, and a considerable proportion of vehicles were still travelling at high speeds when 220 yards from the entrances to the roundabouts. For example, at Aldenham terminal the proportion of cars exceeding 40, 50 and 60 m.p.h. at this distance were 85%, 39% and 6% respectively.

65. The present signing system on motorways consists of advance direction signs one mile and $\frac{1}{2}$ mile before the exit, followed by count-down distance marker posts at 300, 200 and 100 yards in front of the final direction sign. Where a motorway leads directly into a roundabout junction with an all-purpose road an 'End of Motorway 1 Mile' sign is followed by a roundabout warning sign. This is supplemented by a 'Reduce Speed Now' plate, about $\frac{1}{2}$ mile from the roundabout, an advance direction sign and then an 'End of Motorway' sign.

66. On high speed all-purpose roads a roundabout warning sign supplemented by a 'Reduce Speed Now' plate at about $\frac{1}{2}$ mile from the roundabout is followed by an advance direction sign at $\frac{1}{2}$ mile from it. On slower roads a roundabout warning sign may be supplemented by the word SLOW on the carriageway, which may also be repeated nearer the junction. The basic object of the present system of signing is to indicate the existence of a hazard to a driver and leave it to him to adjust his speed to accord with the conditions and the capability of his vehicle. Nevertheless, the shortcomings of this system are evident. Many drivers are in need of more positive guidance as to the correct approach speed to a hazard; the injunction 'Reduce Speed Now' is imprecise and foreign visitors may not find the wording intelligible.

67. In some continental countries some hazards are indicated by the use of 'count-down' speed limits. These mandatory limits are difficult to enforce and they probably have little more than an advisory function. For this reason they have not been adopted in this country. However, because there is no experience of their use here it is proposed that on some fast roads, and especially on those with a history of accidents caused by excessive approach speeds to exit or terminal points, there should be a limited trial use of advisory count-down signs indicating progressively lower speed limits. The aim would be to test the effect of this greater precision upon the accident rate. If successful, the experiment could be extended to further selected roads.

Advisory Limits

68. There is a body of opinion which favours the occasional use of advisory speed limits, in the belief that motorists respond better to advice than commands. It has sometimes been suggested, too, that advisory limits might be applied generally on rural roads, and experiments with general advisory speed limits on main roads are now in progress on the Continent and in the U.S.A. It would, however, be particularly difficult without actual trials to decide whether all general limits should be advisory or some advisory and some mandatory. For example, could an overall limit on motorways be mandatory, while general limits on other roads were advisory – and vice versa? Could dual carriageway general limits be advisory while single carriageway limits were mandatory? Such a 'mixed' system would, by its lack of simplicity, create intolerable confusion among motorists, and it seems likely that if one such general limit were advisory they would all have to be. Against a universal use of advisory general limits it can be argued that they would be widely disregarded by all those who consider themselves skilled drivers possessing exceptional cars – and they are many. This would in itself reduce their effect and cause irritation and resentment to those who complied with them. Before long they, too, would cease to observe the limit, which would soon become quite ineffective as a road safety measure. It seems likely, therefore, that the most effective speed limits are those which are subject to enforcement and penalties and about whose legal force there is no doubt in the public mind.

69. However, it seems probable that there is scope for the use of advisory speed limits at bends, though firm conclusions on this must await the outcome of the current experiment being made in Worcestershire, Dorset and East Sussex by the Road Research Laboratory. This will indicate the degree of compliance with this type of advisory limit and the effect they actually have upon the numbers and types of accidents at bends. It is claimed by the transport authorities in the U.S.A. and in Australia and New Zealand that accidents on bends have been reduced since similar signs were introduced in their countries, and there are indications that they would be a popular innovation in this country. Even at this early stage information and views on the desirability of such limits would be welcomed — particularly from those who have experience either of their use abroad or of those operating in the present experiment in the three counties mentioned above. If the results of the current experiment prove satisfactory, the wider use of these limits could be of particular assistance to drivers, especially where they are not familiar with that length of road.

70. There might be a case for using advisory speed limits as a 'second best' on stretches of road where the reasons for a speed restriction are not readily apparent and where a mandatory restriction might not be enforceable. This might even be helpful in small villages where there are hazards unknown to strangers but where enforcement of a mandatory limit would be difficult. Apart from their use in count-down limits, already mentioned, other possible applications could be on roads where there are special environmental features, such as panoramic stretches of road. But even if such types of advisory limit were considered desirable the criteria would need to be carefully drawn to prevent any over-proliferation of advisory limits leading to confusion in the public mind between them and mandatory limits.

'Prima facie' Limits

71. A number of States in the U.S.A. and Australia impose 'prima facie' speed limits — a halfway house between mandatory and advisory limits. These are defined as 'speed limits which may be exceeded if it is reasonable and prudent to do so'. In effect, this means that if a driver who has exceeded the prima facie limit is charged with driving too fast for safety, the burden of proof is on him to establish

that his speed was reasonable and prudent, taking due account of conditions and hazards. Against *prima facie* or advisory limits it can be argued that if a limit is worth having at all, it is worth having properly. The point of a limit is to restrain the individual on roads where conditions are normally such that he may find difficulty in selecting speed which is well suited to the circumstances. There may be hidden hazards; the road may be of an inferior design; traffic conditions on it may require particular care for the abilities and reactions of other drivers. If such conditions do not exist, a limit is unnecessary. If they do exist, a limit should be imposed and observed. A halfway house – limits which one obeys sometimes – would be a confusing alternative which would place upon the police a very difficult responsibility in judging whether to prosecute or not. It would also be an exercise of a power based on the presumption that the defendant is guilty until he proves himself to be innocent, a presumption which is alien to English Law. It seems likely, therefore, that such limits would be disliked by the courts and that their operation would appear harsh and arbitrary to the motorist.

'Switch-on' Speed Limits

72. In November 1965 the then Minister of Transport, following a series of disastrous multiple crashes in fog on motorways, announced that he proposed to install vertical pairs of alternatively flashing amber lights at one-mile intervals along the motorway and at entry points. They were installed by December 1965 and are switched on and off by the police as conditions warrant, to give advance warning of hazards and to indicate that drivers should reduce their speed to an advisory limit of 30 m.p.h., or lower if necessary, as they approached them. These arrangements covered not only foggy conditions but also ice or obstruction of a carriageway by roadworks or an accident.

73. A year later a plan was announced under which the central reserve of all motorways would be equipped with remotely controlled emergency warning signals. These would replace the temporary flashing amber signals by the mid-1970s and would be aimed at reducing multiple accidents and securing safer all-weather driving conditions by indicating clearly to drivers maximum advisable speeds in bad weather and in the vicinity of an accident or roadworks or other hazards. These signs, which are to be

controlled by the police, as well as indicating advisory speeds of 10, 20, 40 or 60 m.p.h., show a 'lane closed' symbol and an octagonal 'motorway clear ahead' symbol when the hazard has been passed. The system is currently being installed on the M.1, M.4 and M.6 motorways. It can probably be extended in future to provide other facilities, such as the collection from the motorway and transmission to the signal control centre of information about traffic volumes, speeds and weather conditions. It would then provide a comprehensive system of traffic and safety control. In the very long term the signs might even perhaps be controlled and switched on by a computer capable of assessing these variables and imposing different levels of speed limit as necessary.

Minimum Speed Limits

74. There is some evidence to suggest that accident risks on motorways and other roads increase with the speed differentials of traffic, i.e. the difference between the speeds of the slower and faster vehicles using the roads. An American study, for instance, showed that in normal traffic on main rural roads less than 10% of vehicle pairs had a speed differential of more than 20 m.p.h., whereas 50% of cars involved in rear-end collisions had a speed difference exceeding 20 m.p.h. and nearly 10% had a speed difference exceeding 50 m.p.h. On the basis of evidence of this kind, it has been suggested that minimum speed limits could significantly reduce accidents by reducing speed differentials.

75. Against this, the practical difficulties of imposing general mandatory or advisory minimum speed limits in this country either on motorways or on all-purpose roads would probably outweigh their possible advantages. For example, on motorways much slow traffic is of great economic importance. Limits of this kind would have the effect of diverting much of this very necessary traffic on to other roads where journey times would be longer, congestion worse and accident rates higher. This would, in effect, be to forego one of the economic advantages of the motorways.

76. Apart from the physical difficulties of enforcement, there is probably little traffic on motorways which wilfully dawdles. On the contrary, one can think of cases — not only tired, elderly, timid or inexperienced drivers — where

the driver has a very good reason for choosing a low speed. Pressure to go faster, however mildly applied, might be positively harmful and there seems to be little reason for not relying on the personal judgment of the driver in these cases; any cases of wilful dawdling can already be dealt with by advice or prosecutions. There would, in any case, have to be 'escape clauses' for emergencies and bad weather, as well as for special vehicles. There may, however, be special cases in which an advisory minimum speed limit could be imposed, for example, at a point where traffic tended to slow down to enjoy the scenery on a road at the price of causing considerable congestion. But in most cases of this kind it would probably be better, and safer, to provide parking spaces from which to admire the view. It is not proposed to alter the existing arrangement by which mandatory minimum speed limits can be imposed by special order on long structures such as river bridges or tunnels, where very slow-moving vehicles can cause considerable obstruction.

Limits Related to Drivers' Age and Experience

77. Both France and Northern Ireland have recently introduced legislation to enable special speed limits to be imposed on inexperienced drivers. In Northern Ireland, any vehicle carrying an L or R (Restricted) plate is limited to 45 m.p.h., and an R plate must be carried for one year after the driver has passed the driving test. Moreover, the probationary period can be extended by the courts, on the commission of certain offences, by from 3 to 12 months. In France, the Government have imposed a speed limit of 90 k.p.h. (56 m.p.h.) on drivers under 20 and on all drivers who have held a licence for less than a year. (They are not, however, required to carry any special identifying plate or mark.) A report produced by the Ministry of Transport's Area Road Safety Unit in Warwickshire in 1965 examined the liability of drivers with less than six months' driving experience to single vehicle accidents. It showed that whereas only 6.8% of drivers with over five years' experience were involved in single vehicle accidents, 19.4% of those with under six months' experience were so involved. This group amounted to 11% of all drivers included in all forms of accidents. Those with under six months' experience accounted for 20% of all single vehicle accidents. Of the drivers with under six months' experience involved in accidents 56% were learner drivers.

78. There is, however, no statistical evidence to show that learners drive at excessive speeds. Their accidents could, in fact, result from inexperience or even youth itself rather than from speeding. It would also be difficult to ensure that plates were exhibited and enforcement would therefore be impracticable. It is felt, therefore, that it would on the whole be premature to introduce driver speed limits based on age or experience, but the Ministry will continue to study the effects of these limits where they have been introduced abroad.

Chapter VI—Future Changes and Summary of Proposals for Policy and Research

79. Chapter I of this paper outlined the principles lying behind past and present policy on speed limits and discussed the factors which must influence the making of speed limit policy. Among these factors were the volume of traffic, vehicle design, the quality of the road system, the standard of driver behaviour and public attitudes and opinions generally. To take account of these changing factors, speed limit policy must be essentially flexible (within the limitation that too frequent change can be confusing). It must also be based on continuous and careful observation. If, for example, substantial improvements were being obtained in vehicle safety and driver behaviour on the motorways, then some upward adjustment of motorway limits might be possible provided that this did not cancel out the benefits of those improvements. On the other hand, if it became clear that conditions were emerging (either on motorways generally or on individual motorways) in which speeds were still a source of danger, then some downward revision might have to be considered. The essential point is that the policy should provide for flexibility of this kind.

80. It is also important that there should be adequate data on which to base any future policy decisions. A number of organisations already have machinery for collecting and analysing this information, including Government Departments, the Road Research Laboratory, local authorities and the police. In future, it will also be possible to look to a new source of information on the causes and circumstances of accidents—the Area Road Safety Units. These are still in their infancy, but it is already clear that their particular contribution in the systematic analysis of accident information could be valuable, not only in the formulation of future policy on speed limits, but also in dealing with particular speed limit proposals.

81. Recent efforts to improve road safety have increasingly been directed towards detailed examination of the local circumstances in which accidents arise, with a view to suggesting specific remedies for particular problems, and often a 'package' of remedies. This method of approach will make it considerably easier than it is at present to determine the circumstances in which a speed limit should be applied on a particular road. For example, as an overall measure affecting the whole length of the road at all times of day and night a speed limit is probably not the right answer if the bulk of the accidents on a particular road are concentrated at a junction. It is appropriate if a number of hazards are spaced out along a length of road and cannot economically be eliminated by other means. It should perhaps also be stressed that speed limits are not intended to be permanent substitutes for other, longer term measures designed to increase safety—for example, improvements to the road system and improved driver training and education. Until these longer term measures become operative, however, it would be wrong not to make use of speed limits in view of all the evidence in their favour.

Metrication

82. It may be necessary in the future to take decisions on the best levels for speed limits under a metric system. If so, the reform could take one of two forms. It would be possible either to make minor adjustments to the actual level of present limits to arrive at a system of metric near-equivalents. Or a more radical reconstruction might be made, which would result in a metric speed limit system in which the levels adopted were substantially different from those now in use. In both cases three main principles would have to be considered in selecting the level of the new limits. First, the new system should be simple and readily understandable to road users. Secondly, the 'steps' between limits should be big enough for drivers to distinguish between them (this is important also for enforcement purposes). Thirdly, the levels of speed selected should fulfil the general aims of speed limit policy as outlined in Chapter I of this paper.

83. An important effect of any change to a metric system of speed limits would be to throw in question the present policy that speed limit 'steps' should be graduated in some multiple of ten. It would, in fact, be necessary to

decide whether the steps between limits should be of 15 or 20 k.p.h. (i.e. 9 or 12 m.p.h.) – or, indeed, whether a more complex scale involving steps of both 15 and 20 k.p.h. should not be adopted. Metrification of vehicle speed limits, varying from 5 to 50 m.p.h., would also need to be dealt with. The introduction of any such new system would also have to be accompanied by an intensive campaign of public education and publicity. These are very complex problems and views would be welcomed during the present discussions, both on the general principles and on possible scales for metric speed limits. (See the conversion table at Annex C.)

Research and Further Study

84. There is still considerable scope for useful research in the field of speed limits, not only to provide a firm foundation for future developments in policy, but to assess the effectiveness of any changes in policy and practice which result from the present study and consultations. Earlier chapters of this paper have already proposed that further study should be made of methods of enforcing speed limits. The use of computerised switch-on speed limits also needs further study. Other specific subjects which might merit further research (not necessarily in order of importance) include:

- (a) speed as a cause of accidents;
- (b) the relationship between speed limitation and accident reduction and the reasons why speed limits reduce accidents;
- (c) the value of existing speeds as a guide in determining speed limits;
- (d) the relationship between speed limits, traffic flow and road capacity;
- (e) the use of special road surfaces as a means of limiting speeds;
- (f) the identification of vehicle speeds at the time of accidents; and
- (g) the improvement of criteria for determining speed limits.

Principles Underlying Future Policy

85. The principles on which speed limit policy has traditionally been based in this country have been

rigorously examined over the past two years in the light of experience both at home and abroad, and there appears no reason seriously to doubt their general validity. The value of a policy which leads to speed limits acceptable to the public has been the theme of much of the evidence put forward. Where criticisms have been made, they have usually been based on a lack of consistency in the application of limits. It is accepted that there may be some force in these criticisms, and future policy will be designed to meet them so far as possible. It is hoped that the use of the new and simpler criteria at Annex A will result in greater consistency and uniformity in the application of speed limits and will strike a fair balance between the freedom and convenience of motorists and the need to reduce accidents.

86. The general principles already described are designed to secure greater uniformity in speed limit policy and the new proposals based on them are intended to operate on three fronts. First, the limits themselves must be so set that the majority of road users have confidence in them. Secondly, respect for speed limits must be increased by a programme of public education, which would publicise the reasons for speed limits and the benefits they can bring. Thirdly, these two must be complemented by enforcement directed against those who refuse to comply with speed limits voluntarily.

Summary of Proposals for Discussion

87. The following proposals are put forward for comment, though the Government has not at this stage reached firm conclusions upon them. (They do not include those suggestions which have *not* been favoured in this paper, but these are not, of course, excluded from further discussion.)

- (i) The 30 m.p.h. limit should remain as the basic limit in dense urban conditions where the road in question carries for a large part of the day a high volume of mixed traffic engaged in a wide variety of local activities. 30 m.p.h. limits should, as a general rule, continue to be indicated only by the presence of street lighting and not by a widespread use of 30 m.p.h. 'repeater' signs. (Paragraphs 20–28.)

- (ii) There should be a greater use of 40 m.p.h. limits on town roads, particularly where special measures (e.g. parking controls, traffic management, junction improvements, etc.) have been provided. Most ring, radial or other main routes would fall into this category. (Paragraph 29.)
- (iii) New and more precise criteria should be published for each speed limit on the lines of the draft at Annex A. (Paragraph 30(a).)
- (iv) It should no longer be possible to impose new 30 m.p.h. limits on unclassified roads simply by the installation of a system of street lighting. (Paragraphs 23–25, 30(b).)
- (v) There should be an early review of all local authority speed limits in the light of the new criteria and the principles outlined in this paper. (Paragraph 30(c).)
- (vi) Machinery should be introduced to ensure that speed limit practice (and particularly marginal cases) in each local authority area will be reviewed at least once every five years in a continuous review. (Paragraph 30(c).)
- (vii) There should be a sustained publicity campaign to inform the public of the law on speed limits, the benefits from observing them and the penalties incurred by breaking them. (Paragraph 30(d).)
- (viii) 40 m.p.h. limits should be introduced in some larger and more extensive villages on main roads. (Paragraph 48.)
- (ix) Advisory speed limits should be introduced in a certain number of villages off main roads. (Paragraphs 48 and 70.)
- (x) Heavy goods vehicles should be restricted to a speed limit of 60 m.p.h. on motorways and should continue to be restricted to 40 m.p.h. elsewhere. (Paragraphs 53–54.)
- (xi) The speed limit on light vans should be raised on rural all-purpose roads from 40 m.p.h. to 50 m.p.h. (Paragraphs 56–57.)
- (xii) There should be a limited trial use of advisory countdown speed limits before certain hazards. (Paragraphs 64–67.)

88. In addition to these proposals, views are also invited on:

- (a) The circumstances in which speed limits of 50 m.p.h. (or any other speed limits) should be imposed on urban motorways (Annex A, paragraph 2(f));
- (b) the relative merits of 'blanket' and 'tailor-made' speed limits on rural main roads and the levels at which they should be set (Paragraphs 38-44);
- (c) the use of advisory 'count-down' speed limits on the approaches to certain villages in which a mandatory limit was in operation (Paragraphs 5 and 64-67);
- (d) the use of advisory limits (either maximum or minimum) on some 'scenic routes' (Paragraphs 68-70);
- (e) the levels of speed limit to be adopted under a metric system (Paragraphs 82-83).

Advice on the Application of 30, 40, 50, and 60 m.p.h. Speed Limits

General Considerations

1. The purpose of speed limits is to reduce the speed of vehicles to a level at which drivers can more readily meet the general dangers to be expected on a road : they should not be used as permanent solutions to specific hazards, such as a road junction or bend, nor should they be applied to meet conditions arising only for short periods of the day (e.g. outside schools or factories), since the restriction will be unnecessary for most of the time and may consequently not be respected when it is needed. In such circumstances other measures are likely to be more effective. However, if a speed limit is already in force, or justified, on a contiguous length of road within, say, 150 yards, it may be extended to cover such cases.
2. Speed limits often have only a small effect on average speeds, but there is usually a marked reduction in the percentage of vehicles going more than 5 or 10 miles per hour above the limit fixed. Their effect upon accidents usually includes a reduction in the number of accidents involving fatal and serious injury.
3. The free speeds chosen by drivers on a particular road are a relevant factor in determining the speed limit for that road, but speed levels are not the only consideration. Accidents on the road, its environment and character and the nature of the traffic upon it are also closely inter-related factors. Any existing speed limits on adjoining sections of road should also be taken into account.

Criteria

4. These criteria are for determining appropriate speed limits for specific lengths of road on the basis of local conditions.

(a) *Speed of Traffic*

- (i) The effectiveness of speed limits in controlling speeds depends both upon the readiness of drivers to obey them and upon police supervision. It is thus of primary importance that each speed limit should be accepted by drivers as a reasonable restriction which is justified by conditions on the road. Many authorities regard the speed below which 85% of car drivers travel in free-flowing conditions as a good guide to the appropriate speed limit for that road ; this is referred to as the 85 percentile speed.
- (ii) One practical course is to choose from a range of limits which differ by 10 m.p.h. steps, with a minimum at 30 m.p.h. As it has been found that to fix a speed limit above the 85 percentile speed may sometimes increase speeds slightly, it is generally preferable to set the limit at a point slightly below the 85 percentile speed. But in cases where the 85 percentile speed is only 2 or 3 m.p.h. below the nearest speed limit step, that step may be adopted rather than the one 10 m.p.h. below it, e.g. if the 85 percentile speed was found to be 38 m.p.h., then providing other criteria were satisfied, 40 m.p.h. would be set as the speed limit.
- (iii) In town areas the variations of the 85 percentile speeds along a length of road under free-flowing conditions are generally too great to provide a reliable guide for fixing speed limits. In such cases particular attention should be paid to the other criteria set out below.

(b) *Environment of Road*

Most drivers try to adjust their speed to the conditions in which they are driving, but the hazards on a road are not always apparent. It is necessary, for example, to take full account of the development along a road in determining its speed limit, since this will determine to a great extent the conditions drivers will meet. When considering the extent of developments, all forms of development and land usage which generate traffic, either vehicles or

pedestrians, should be included, e.g. schools, playing fields, recreation grounds, housing estates, factories, the frequency of roads leading to developed areas, etc.

(c) *Character of Road*

Speed limits should be related to the general characteristics of the road (e.g. its width and layout) and not to specific local or temporary hazards. It is preferable to indicate any particular hazards clearly by warning signs. Speed limits should not be applied permanently where other possible measures would be more effective, e.g. improvement of junctions, provision of new or improved street lighting, super-elevation (banking) of bends, traffic signs. Similarly, the provision of adequate footpaths can be a more effective means of ensuring pedestrian safety than a speed limit.

(d) *Traffic*

- (i) In urban areas the interests of vehicles and pedestrians frequently conflict and, in setting a speed limit, both should be fully considered.
- (ii) It will sometimes happen that a road has to carry abnormally high volumes of traffic over a limited period – for example, when a road is temporarily forming a continuation of a motorway or when a road is being dualled and is subject to roadworks, say, over a period of six months. In such exceptional traffic conditions a speed limit imposed for a limited period may be justified.

(e) *Accident Rates*

A study of types of accidents, their possible causes and frequency may indicate whether an existing speed limit suits present conditions or whether it needs to be changed. On rural roads, for instance, if the numbers of fatal and serious casualties per mile and per million vehicle miles are substantially higher than the average for rural roads, a lower limit may be called for. Where the total casualty rate per million vehicle miles is substantially higher than is normal for rural roads, it would be appropriate to consider a 40 m.p.h. limit, particularly if the casualty rates for pedestrians and two-wheeled

vehicles are above average. A 30 m.p.h. limit would be appropriate where the casualty rate is typical of urban conditions.

(f) *Geometric Layout*

New roads, such as urban motorways or extensions of motorways into urban areas, will often be designed, for reasons of economy, to standards of curvature and visibility based on design speeds of 40 or 50 m.p.h. In such circumstances the speed limit chosen will depend considerably on the design speed of the road. There may be occasions also for extending 30, 40 or 50 m.p.h. limits where the approaches have curves or gradients which are substandard.

Application

5. The attached table sets out conditions typical for various types of speed limit. It is unnecessary for all these conditions to be satisfied simultaneously, but they are set down as a general guide.

6. Where an area is built-up, the choice usually lies between a 30 and a 40 m.p.h. limit, although in the case of some dual-carriageways, where the development is set well back from the road and there are few junctions and little pedestrian movement, then a 50 m.p.h. limit may be more appropriate. Such cases as this will be comparatively rare. The 30 m.p.h. limit generally applies to all fully urban roads. On important roads of good quality a 40 m.p.h. limit should normally be the appropriate one, and it could also apply to fringe areas of a semi-rural type with some development. The establishment of 40 m.p.h. limits often requires some adjustment of 30 m.p.h. limits on continuations. Where the termination would normally be on a steep gradient, sharp bend, hump-backed bridge, etc., the restriction may need to be extended so as to clear the hazard : similarly, an extension may be required to provide good visibility of the speed limit signs.

7. It does not follow that when a 30 m.p.h. limit is raised to 40 m.p.h. speeds will necessarily increase. If the previous 30 m.p.h. limit was ill-observed, speeds may not increase. In general, a well-observed 40 m.p.h. limit, which will encourage respect for speed limits generally, is preferable to an ill-observed 30 m.p.h. limit, which will do the reverse.

8. Although radar speed meters have now made possible the enforcement of speed limits on short lengths of road, it is generally preferable to aim at $\frac{1}{2}$ mile as a normal minimum length on which to apply a limit, so that motorists will not be confused by too frequent changes in speed limit levels along a length of road. The actual minimum length adopted for a limit will depend on the limit applied and also on the conditions at or beyond the end points. It will sometimes be possible to arrive at a suitable length which meets the normal minimum requirement by adjusting the limits on adjoining lengths.

9. It may, in certain circumstances, be appropriate to restrict short lengths of road in the case of isolated small villages where a speed limit would be justified on other grounds. Each case should be considered on its merits, and the fact that only a short length of road would be restricted should not necessarily rule out the imposition of a suitable speed limit.

10. Sometimes it will be necessary, for the sake of uniformity, to include in a restricted length short stretches of road which by themselves would not merit a restriction. Short lengths of, say, not more than $\frac{1}{2}$ mile between 30 m.p.h. limits should be restricted to 40 m.p.h. if they are broadly consistent with the criteria for such a limit. Similarly, over intermediate lengths of between one and two miles a 50 m.p.h. limit might be appropriate.

11. The 50 m.p.h. limit should be applied to roads with above average accident records but on which vehicle speeds and developments would not justify a 40 m.p.h. limit. The 50 m.p.h. limit should not be applied to short lengths of road (less than about three miles), except where the road in question lies between sections of road already subject to 30 or 40 m.p.h. limits (see above).

12. The 60 m.p.h. limit is intended to be applied to roads with little development where the accident record might merit a 50 m.p.h. limit but on which the 85 percentile speed is too high for a 50 m.p.h. limit to be effective (i.e. above 57 m.p.h.). The road will either have dual carriageways or be of four-lane divided construction. The scope for 60 m.p.h. limits will probably be small and there is little experience of their use at present. More detailed criteria will be developed as experience is gained.

Technical Guidance

13. Two of the criteria discussed above, namely speeds and accident rates, depend on measurements of speeds and flows. Considerable care is needed in making these measurements to ensure that the results are representative of normal conditions and are statistically reliable.

14. Speeds of vehicles may be measured in a number of ways (see *Urban Traffic Engineering Techniques*, paragraphs 97–107). The radar speedmeter has the advantage that drivers are usually unaware of its use and their speeds are therefore not influenced. A sample of 100 vehicles in each direction is usually sufficient. The site at which the observations are made should be carefully chosen if it appears that speeds vary over the length in question or if the character of the road varies. If only one site is selected it should not be too near to either end. If no single site appears typical, measurements should be made at several sites. A rough check on the consistency of the measurements may be made by verifying that the 85 percentile speed is roughly 20% greater than the mean speed.

15. The casualty rate can be estimated from the approximate formula :

$$\frac{1,000}{VL} A \text{ Casualties per million vehicle miles}$$

Where A is the number of casualties in *three years* (fatal and serious or all casualties as appropriate), V is the average daily traffic (vehicles) in August, L is the length of section in miles.

Where the traffic is light and/or the section is short, the number of casualties may be small. Small numbers are subject to large random fluctuations, so that careful judgment needs to be exercised when the decision would change with a small change in the 85 percentile speed or in the accident rate.

16. Further detailed guidance on the measurement and analysis of speeds and traffic flows and on testing the significance of accident comparisons may be obtained on request from:

Traffic Engineering Division,
Ministry of Transport,
St. Christopher House,
Southwark Street, London, S.E.1.
Telephone 01-928 7999

Table of Speed Limit Criteria

APPROPRIATE SPEED LIMIT M.P.H.	SPEED OF TRAFFIC (before limit is applied or extended) (e)	CHARACTER OF ENVIRONMENT TO ROAD		TRAFFIC COMPOSITION (c)	CHARACTER OF ROAD (d)	CASUALTY RATES (e)
		(b)	(e)			
30	85 percentile speed of cars not greater than 37 m.p.h.	Built-up area developed on both sides of road, extending in depth. Development should have direct access to the road and should be taken to include all features contributing to a high level of communal activity, e.g. recreation grounds and playing fields to schools. (Can sometimes be taken to include some partially built-up area where the length of road concerned is not long enough for a 40 m.p.h. restriction. In these cases length not normally exceeding $\frac{1}{2}$ mile.)	High proportion of two-wheeled vehicles and large numbers of pedestrians.	Frequent junctions, with visibility inadequate for speeds greater than 30 m.p.h. Pedestrian crossings. Development close to footways.	Casualty rate taken over three years for fatal, serious and slight injuries 5 per million vehicle miles or above.	

continued overleaf

APPROPRIATE SPEED LIMIT M.P.H.	SPEED OF TRAFFIC (before limit is applied or altered)	CHARACTER OF ENVIRONMENT TO ROAD	TRAFFIC COMPOSITION	CHARACTER OF ROAD	CASUALTY RATES
(a)	(b)	(c)	(d)	(e)	
40	85 percentile speed of cars not less than 38 m.p.h. and not greater than 47 m.p.h.	(i) Built-up (as above).	(i) As above, but probably with more severe parking restrictions.	(i) Usually important radial or ring roads and well-designed roads adequate for traffic volume, provided with footways on both sides of road and crossing places where necessary. (ii) Partially built-up (usually exceeding 25% of frontage) typical of transitional conditions between built-up and rural areas with building generally set back from road, often with service roads. (Can sometimes be taken to include short lengths open in character lying between lengths restricted to 30 or 40 m.p.h. which are not long enough for separate demarcation : length not normally exceeding ½ mile.)	Casualty rate will be higher than for rural roads and will normally exceed : (a) 3 per million vehicle miles for all types of injury; (b) 1.0 per million vehicle miles for fatal and serious injuries; (c) 1.0 per million vehicle miles for pedestrians and drivers of two-wheeled vehicles. For a 40 m.p.h. limit applied to a road previously subject to a higher limit, the casualty rate must exceed one or more of those rates given above. However, it is not essential that all these conditions be fulfilled simultaneously.

		(iii) Roads such as Urban Motorways, where geometric layout is based on an assumed maximum speed of 40 m.p.h.	Fatal and serious casualty rate <i>per million</i> vehicle miles will normally exceed 1.0 and, associated with this, we would normally expect the fatal and serious casualties per mile of road per annum to exceed 1.5. However, if the rate per million vehicle miles as described above is less than 1.0 but exceeds 0.75, the number of fatal and serious casualties per mile of road per annum must, in that case, exceed 2.00.	All as above for 50 m.p.h. limits.
	60	(i) Rural roads less developed than 40(ii) but having above average casualty rates, see Col. (e). Also applicable to sections of road lying between other sections restricted to 30 or 40 m.p.h.; thus pro- viding transitions of between 1 and 2 miles. (ii) Urban or rural roads with little or no frontage development. (iii) Urban or rural roads with no frontage development.	(i) Applicable to single carriageway roads of two or three traffic lanes, not usually carrying less than 4,000 V.P.D. (ii) Dual or single carriageway roads, such as by-passes.	(i) Dual carriageway, or divided, roads.
	60	85 percentile speed of cars usually about or above 58 m.p.h.	Little or no frontage develop- ment.	All as above for 50 m.p.h.

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ANNEX C

Conversion Table

Miles	Kilometres	Kilometres	Miles
5	8.046	5	3.107
10	16.093	10	6.214
15	24.139	15	9.321
20	32.185	20	12.428
25	40.232	25	15.535
30	48.278	30	18.642
35	56.324	35	21.749
40	64.370	40	24.856
45	72.416	45	27.963
50	80.463	50	31.070
55	88.511	55	34.177
60	96.557	60	37.284
65	104.603	65	40.391
70	112.649	70	43.498
75	120.696	75	46.605
80	128.742	80	49.712
85	136.788	85	52.819
90	144.834	90	55.926
95	152.880	95	59.033
100	160.930	100	62.136
		105	65.243
		110	68.350
		115	71.457
		120	74.564
		125	77.671
		130	80.778
		135	83.885
		140	86.992
		145	90.099
		150	93.206
		155	96.313
		160	99.420

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Ministry of Transport

How Fast?

A Paper for Discussion



London
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1968

This paper, which is put forward by the Ministry of Transport, examines afresh the whole problem of speed limits. It does not set out Government policy; this will be settled later, after a thorough process of consultation. The purpose of this paper is to provide the material for a full public debate.

The paper has been written in consultation with the Departments of the Secretaries of State for Scotland and Wales. For convenience it refers at a number of points to the Minister and the Ministry of Transport. In Scotland and Wales these references should be taken, so far as highway speed limits are concerned, to be references to the appropriate Departments.

The Minister of Transport's statement of 12th July, 1967, on motorway limits announced the first stage of a new policy for speed limits. This paper deals mainly with the second stage of that policy — the future of speed limits on roads other than motorways. It may, of course, be necessary to discuss the motorway limit as part of the general context, but it is primarily the future of speed limits on other roads on which views are sought at the present time. This is not to say that Ministers will not consider views on the motorway limit expressed in the light of its operation since July 1967. The Government's policy has always been that if conditions justify any change in the motorway limit — either upwards or downwards — it will be adjusted.

For convenience the paper refers throughout to speed limits expressed in miles per hour. However, it may be necessary in the future to consider what levels would be appropriate for speed limits in a metric system. The problems of metrication are discussed in paragraphs 82 and 83 of the paper, and Ministers are particularly anxious to receive the views of consulted bodies on this subject.

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 5. Table of speed limit criteria
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